NRC FORM 658
(9-1999)

U.S. NUCLEAR REGULATORY COMMISSION

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DATE OF MEETING
07/16/2002

The attached document(s), which was/were handed out in this meeting, is/are to be placed in the public domain as soon as possible. The minutes of the meeting will be issued in the near future. Following are administrative details regarding this meeting:

Docket Number(s)	**Project No. 689**
Plant/Facility Name	
TAC Number(s) (if available)	
Reference Meeting Notice	**ADAMS Accession No. ML021830280**
Purpose of Meeting (copy from meeting notice)	**Meet with NEI regarding early site permit applications**

NAME OF PERSON WHO ISSUED MEETING NOTICE	TITLE
R. Jenkins	**Senior Project Manager**

OFFICE
NRR

DIVISION
N/A

BRANCH
NRLPO

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AGENDA
JULY 16, 2002, MEETING
WITH NUCLEAR ENERGY INSTITUTE (NEI)
T10A1 1:30 -5:00 PM

1:30 p.m.	Introductory Comments	NRC / NEI
1:40 p.m.	Follow-up Items from June 13 Meeting	
	. Status of Seismic Regulatory Documents	NRC
	. Fee Status- ESP Local Public Meetings	NRC/NEI/Applicants
	. ESP-2: NRC Pre-Application Activities	NEI/Applicants
	. ESP-12: Seismic Demonstration Project	NEI/Applicants
	. Prioritization of Generic ESP Issues	NEI/Applicants
	. ESP-2: Environmental Review /Site Visit	NRC
2:25 p.m.	Topics for Next Meeting	NRC/NEI/Applicants
	. ESP-1: ESP Application Template	
	. ESP-8: Use of a bounding approach for providing fuel cycle and transportation information required by NEPA (Tables S-3 & S-4)	
	. ESP-10: Use for ESP of relevant findings from 10 CFR 51, Subpart B, Appendix B (License Renewal GEIS)	
	. ESP-17: Use of existing site/facility information (PRM-52-1)	
2:35 p.m.	Discussion of 10CFR 52.17 Requirements / Severe Accident Design Mitigation Alternatives/ Severe Accident Mitigation Alternatives/ Bounding Plant Parameter Approach	NRC/NEI/Applicants
	. Regulatory Framework	
	. Industry Methodology / Approach	
	. NRC Review Process	
	. Specific Issues	
3:30 p.m	Break (10 minutes)	
4:35 p.m.	Public Comment	
4:45 p.m.	Summary	NRC/NEI/Applicants
5:00 p.m.	Adjourn	

Early Site Permit Meeting with Nuclear Energy Institute

July 16, 2002
NRC Handouts

Early Site Permit Meeting

- Follow-up Items from June 13 Meeting
  - Fee Status - ESP Local Public Meetings
  - Status of Seismic Regulatory Documents
  - ESP-2: Environmental Review/ Site Visit (T. Kenyon)

NOTE: NEI Discussion Papers (ESP-6, ESP-7, ESP-12) transmitted via e-mail are also provided

Fee Status - ESP Local Public Meeting

- Parts 170 & 171 revised June 24, 2002
- Fee waiver criteria changed
- Waiver applies only when request submitted for specific purpose of supporting generic regulatory improvement efforts of NRC
- Local public meetings are part of NRC ESP review process and are applicant-specific

Status of Seismic Related Regulatory Documents

- Regulatory Guide 1.138, "Laboratory Investigations of Soils for Engineering Analysis and Design of Nuclear Power Plants"(Issued for Comment as DG-1109 published 08/2001, proposed Revision 1).(ML003740184)
  - Not Scheduled: Issuance possible by 2/03 assuming high priority is assigned
- NUREG/CR-6769, "Technical Basis for Revision of Regulatory Guidance on Design Ground Motions: Development of Hazard-and Risk-consistent Seismic Spectra for Two Sites"
  - Issued in April 2002

Status of Seismic Related Regulatory Documents (Cont'd)

- NUREG/CR-6728, "Technical Basis for Revision of Regulatory Guidance on Design Ground Motions: Hazard- and Risk-consistent Ground Motion Spectra Guidelines"
  - Issued in October 2001

Early Site Permit Pre-Application Environmental Site Visit

Thomas J. Kenyon
Senior Environmental Project Manager
NRR/DRIP/RLEP
July 16, 2002

Purpose

Pre-application environmental site visit will improve efficiency & effectiveness of review

- Identify potential issues for early resolution
- Focus on key review areas
- Likely improve results of acceptance review
- Likely reduce number of Requests for Additional Information

Site Visit Activities

- To discuss:
  - expectations for the application
  - compliance with NRC guidance or alternative approaches
  - potential siting issues
- To characterize the environmental resources of the site
  - observation
  - discussion with local, State, and Federal officials

Preparation Activities

Review information on site and surrounding area

- Final Environmental Statement of adjacent operating facility
- Relevant operating experience from adjacent operating facility
- Other sources
  - » threatened and endangered species information
  - » census data
  - » surveys

Review Team Composition

- 1 Project Manager
- 5 Environmental Specialists
  - Terrestrial ecology
  - Aquatic ecology
  - Health physics/radiation protection
  - Water use/quality
  - Meteorology/air quality
- Smaller team may be appropriate for North Anna

Differences Between ESP and LR Environmental Reviews

- There is no rulemaking to focus scope of issues
  - There is no GEIS
  - There are no Category 1 issues
- All issues will require detailed review
  - Different information
  - Current information
  - Information can be referenced
- Staff will be looking at
  - Construction impacts
  - Operating/maintenance impacts

Conclusion

Pre-application environmental site visit will improve efficiency & effectiveness of review

NEI

ESP-13: Seismic and Geotechnical Demonstration Proposal

Nuclear Energy Institute
Early Site Permit Task Force

Presentation to the

U. S. Nuclear Regulatory Commission

NEI

Background

- Industry presented generic seismic and geotechnical methodology to the NRC at June 13th meeting
  - NRC voiced general acceptance of methodology
- NRC expressed interest in a seismic and geotechnical demonstration
  - Real-time application of implementing guidance
    - Work through new or untried guidance
    - Demonstrate through practice use of new guidance & regulations
    - Yield guidance of generic applicability for all ESP applicants – present and future
- NEI ESP Task Force agreed to consider request and present proposal

NEI

Demonstration Proposal

- ESP potential application farthest along in seismic and geotechnical development work would provide demonstration
  - Applicant may vary depending on aspect of methodology being addressed
- Provide NRC with detailed schedule of seismic and geotechnical tasks
  - NRC indicates activities or tasks it is interested in observing, assessing, or discussing further

NEI

Demonstration Proposal (Cont'd)

- Applicants would make available to NRC internally approved output from key tasks or analysis
  - NRC accepts data as unofficial
  - NRC provides meaningful and timely feedback on findings, results, and methodology
- Applicants would coordinate responses to NRC questions and informal requests for information

NEI

Demonstration Proposal (Cont'd)

- Meetings held with NRC at conclusion of:
  - Probabilistic seismic hazards analysis
    - October 2002 (proposed)
  - SSE ground motion development
    - November 2002 (proposed)
- Exact dates of meetings to be determined and following expert consultation / Board of Review
- Involvement of multiple applicants will enhance breadth and value of the pilot demonstration

NEI

Demonstration Proposal (Cont'd)

- Meeting Purpose
  - Review findings, approach, methodology
  - Provide opportunity for other ESP applicants to raise/address differing situations / approaches
  - Exchange lessons learned in applying guidance
  - Obtain feedback from NRC
    - Provide forum to seek closure on outstanding questions and issues

ESP-6, Use of Bounding Plant Parameters Envelope

Nuclear Energy Institute
Early Site Permit Task Force
Presentation to the
U. S. Nuclear Regulatory Commission
July 16, 2002

NEI

Bounding PPE Approach

- ESP applicants are not required or expected to specify the type of plant to be built
- Bounding PPE approach is fundamental to ESP process
- A bounding PPE serves as a surrogate for specific facility information, providing
  - Flexibility for future COL applicants
  - Technical basis for NRC review and issuance of ESPs
- Obviates the need for separate SSARs and ERs for various reactor types and provides for selection of future designs

NEI

Bounding PPE Approach (cont.)

- Supports safety, environmental and emergency planning review by NRC
- The bounding PPE will be used to meet ESP application requirements in 10 CFR 52.17(a)(1) for:
  - "Analysis and evaluation of the major SSCs of the facility that bear significantly on the acceptability of the site under the radiological consequence evaluation factors identified in 50.34(a)(1)"
  - Description of:
    - Number, type and thermal power of the facilities
    - Anticipated maximum levels of radiological and thermal effluents that each facility will produce
    - Type of cooling systems, intakes and outflows that may be associated with each facility

NEI

Bounding PPE Approach (cont.)

- Part 52 change recommended to clarify acceptability of bounding PPE approach going forward

NEI

Bounding PPE Approach Questions for Discussion

- Industry:
  - What potential concerns or questions does the NRC have with the use of PPEs?
  - Please discuss the bounding parameter "icing effects" example more fully.
  - Please discuss anticipated review process, e.g. use of SRPs.
- NRC
  - (1) Can more than one value be provided in an ESP application, 2) if a value is provided for a new technology and no bounding PPE exists, what kind of NRC review is conducted?
  - For non-certified designs, applicants will utilize best-available information from vendors. Is the use of non-certified design information acceptable for establishing PPEs, and what is the regulatory risk?

NEI

NEI

ESP-7: Guidance for Satisfying 52.17(a)(1) Requirements

Nuclear Energy Institute
Early Site Permit Task Force

Presentation to the

U. S. Nuclear Regulatory Commission

NEI

Issue

- 10 CFR 52.17(a)(1) requires, in part, that an ESP application contain an analysis and evaluation of the *major SSCs of the facility* that bear significantly on the acceptability of the site under the radiological consequence evaluation factors identified in 10 CFR 50.34(a)(1)
- How does the applicant analyze and evaluate when the facility and SSCs are not known?
- How does the applicant intend to meet NEPA requirements with respect to environmental effects of accidents?

NEI

Background

- "Radiological consequence evaluation factors"
  - Found in 10 CFR 50.34(a)(1)(ii)(D)(1)&(2)
- Those factors are dose limits at the exclusion area and low population zone boundaries under accident conditions
  - 25 rem TEDE individual dose limit at exclusion area boundary for any 2 hour period following the postulated fission product release
  - 25 rem TEDE individual dose limit at the outer boundary of the LPZ during the entire period of radioactive cloud passage

NEI

Approach

- Accomplish the required "analysis and evaluation"
  - by means of a bounding approach
  - Using several PPE values
- PPE is effectively equivalent to the facility description and is representative of the structures, systems, and components that bear significantly on site acceptability
- Each applicant provides bounding analysis enveloping reactor types of interest
  - Analysis contains site-specific information, selected bounding PPE values, and an evaluation demonstrating site-specific information is bounded by PPEs

NEI

Approach

- PPEs of interest:
  - Atmospheric dispersion factors (*x*/Q)
  - Release points
  - Postulated source term
- Bounding PPE values reflect bounding plant characteristics for ESP analysis; at COL, selected design must be demonstrated to yield acceptable radiological dose consequences that meet the 10 CFR 50.34(a)(1) requirements.

NEI

Approach (cont.)

- Approach is consistent with expectation that applicants need not know the type of reactor at the ESP stage
- 10 CFR 52.17(a)(1) requires a safety assessment of the acceptability of the site, utilizing the radiological consequence evaluation factors
  - It does not require an evaluation of radiological accidents

NEI

Approach (con't)

- Information from one or more designs would be used to establish accident frequencies and evaluate bounding radiological consequences.
- For some designs, a direct correlation may not exist with all accident classes defined in NUREG-1555.

NEI

Approach (cont.)

- Once a technology is selected (e.g., at COL stage), the applicant would be expected to demonstrate that the various classes of accidents for the selected technology are bounded by the relevant PPEs specified in the ESP
- Applicants accept the business risk
  - If impacts not bounded, further evaluation and analysis would be required at COL stage to demonstrate acceptability of selected design on the site

ESPTF@NRC 20020716

DRAFT

NEI

ESP-12: Severe Accident Mitigation Alternatives (SAMAs)

Nuclear Energy Institute
Early Site Permit Task Force

Presentation to the

U. S. Nuclear Regulatory Commission

July 16, 2002

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DRAFT

NEI

Issue

- 10 CFR 52.17(a)(2) requires, in part, that an ESP application contain a complete Environmental Report as required by 10 CFR 51.45 and 51.50
- NUREG-1555, Section 7.3, identifies the review of SAMAs as applicable to Early Site Permits
- SAMA requires consideration of design and facility processes dependent on reactor type
- How can applicant and NRC analyze and evaluate when the facility and SSCs are not known?

July 16, 2002

2

DRAFT

NEI

Background

- Requirements:
  - No specific regulation requires SAMA
  - Some recognize that environmental review of ESP will not be all encompassing
    - 52.17, 52.18, 52.79(a)(1), 51.45(c)
- Guidance:
  - SECY-91-041 recognizes some issues, including SAMAs, as beyond ESP
  - SECY-02-077 recognizes licensee may not know reactor type for ESP

DRAFT

NEI

Approach

- Reactor type may not yet be determined at ESP stage, but must be at COL stage
- SAMAs can, and should, be evaluated as design issue at COL stage
  - COL should reference any design certification SAMA

Topics for Discussion in Support of ESP Applications and Reviews

ESP Discussion Topic	Target Discussion Time Frame
1. ESP application template, including common Table of Contents	April 1 – Initial discussion (SMM) July 16 – Follow-up Aug. 22 – Follow-up
2. ESP inspection guidance	April 24 – Initial discussion May 20 NEI letter May 28 – Follow-up
3. QA requirements for ESP information	April 24 – Initial discussion May 20 NEI letter May 28 – Detailed discussion June 13 – Follow-up TBD – Applicant submittal of QA Plans
4. Nominal NRC review timeline	April 1 – Initial discussion (SMM) May 28 – Follow-up September 25 – Detailed discussion
5. Mechanism for documenting resolution of ESP issues	April 24 – Initial discussion May 28 – NRC proposal June 13 – Follow-up Implementation ongoing
6. Use of bounding plant parameter envelope approach	July 16 – Initial discussion
7. Guidance for satisfying §52.17(a)(1) requirement for description and safety assessment of the facility	July 16 – Initial discussion
8. Use of a bounding approach for providing fuel cycle and transportation info required by NEPA (Tables S-3 & S-4)	August 22 – Proposed
9. Criteria for assuring control of the site by the ESP holder	4Q02
10. Use for ESP of relevant findings from 10 CFR 51, Subpart B, Appendix B (License Renewal GEIS)	August 22 – Proposed
11. Criteria for determining the initial duration of an ESP (10-20 years)	4Q02
12. Guidance for satisfying NEPA requirement to evaluate severe accident mitigation alternatives	July 16 – Initial discussion
13. Guidance for seismic evaluations required by 10 CFR 50, Appendix S	June 13 – Detailed discussion July 16 – Follow-up
14. Applicability of Federal requirements concerning environmental justice	4Q02
15. Appropriate level of detail for site redress plans	4Q02
16. Guidance for ESP approval of emergency plans a) Major features b) Complete plans	a) 4Q02 b) 2003
17. Use of existing site/facility information (including, but not limited to, PRM-52-1)	August 22 – Proposed
18. NEPA-required review of alternatives (PRM-52-2)	September 25 – Proposed

19. Addressing effects of potential new units at an existing site	4Q02

ESP-6

TOPIC: Use of Bounding Plant Parameter Envelope (PPE)

DESCRIPTION:

Part 51, Subpart A, delineates the information that must be included in an early site permit application. In some instances, this information is a value. For example, §52.17(a)(1)(iv) states that the application must contain the maximum level of radiological and thermal effluents each facility will produce and §52.17(a)(1)(v) requires a description of the type of cooling systems, intakes, and outflows that may be associated with each facility. For certified designs, the associated PPE may have values that could be used to satisfy the two examples cited above. However, because a specific reactor type will not typically be specified in an ESP application, the industry has proposed to use a bounding PPE in lieu of specific design information.

QUESTION FOR DISCUSSION:

1. Industry: What potential concerns or questions does the NRC have with the use of PPEs?
2. Industry: Please discuss the bounding parameter "icing effects" example more fully.
3. Industry: Please discuss anticipated review process, e.g. use of SRPs.
4. NRC: Can more than one value be provided in an ESP application, 2) if a value is provided for a new technology and no bounding PPE exists, what kind of NRC review is conducted?
5. NRC: For non-certified designs, applicants will utilize best-available information from vendors. Is the use of non-certified design information acceptable for establishing PPEs, and what is the regulatory risk?

INDUSTRY APPROACH:

A bounding PPE is a surrogate for specific facility information in the ESP application that provides needed flexibility to future COL applicants, while providing the NRC with the technical basis for review and issuance of ESPs. A bounding PPE will be used to meet requirements for ESP applications to describe the following:

- 52.17(a)(1)(i), The number, type and thermal power of the facilities
- 52.17(a)(1)(iv), The anticipate maximum levels of radiological and thermal effluents that each facility will produce
- 52.17(a)(1)(v), The type of cooling systems, intakes and outflows that may be associated with each facility

Additionally, the PPE will be used for the "analysis and evaluation of the major structures, systems, and components of the facility that bear significantly on the acceptability of the site under the radiological consequence evaluation factors identified in 50.34(a)(1)." Note: the evaluation of radiological consequences required by

52.17(a)(1) using the bounding parameters approach is discussed separately under Topic ESP-7.

The exact methodology used to develop the PPE is not significant for the NRC's review and approval of an ESP application. Each licensee will seek approval of their selected site for a future reactor that will fall within the established bounding PPE. At the time that the licensee prepares and submits a Combined License (COL) Application to the NRC, it will be incumbent on the applicant to demonstrate that their selected design fits within the PPE used for the Early Site Permit. Aspects of the proposed plant design that are not bounded by the PPE approved in connection with the ESP would be subject to NRC review and hearing at the COL stage.

The Site Safety Analysis Report and the Environmental Analysis in the Environmental Report submitted as part of the ESP application will be based on the PPE parameter list defined by the NEI ESP Task Force. The actual values submitted for the PPE may differ between applicants due to business decisions concerning desired parameter margins and number of potential units.

In particular, the environmental effects of the future nuclear power plant(s) to be located at a proposed site can be evaluated on the basis of the bounding PPE defined for the ESP application. Thus the NRC will be able to approve the suitability of a proposed site based on the collection of bounding data contained in the PPE. This will include items such as the number and thermal power levels of proposed units, maximum levels of radiological and thermal effluents, and types of cooling systems, intakes and outflows. Accident consequence evaluations will be based upon a composite isotopic inventory that is representative of the range of plant types considered.

Use of the bounding PPE approach obviates the need for separate SSARs and ERs for each possible design that might be built on a site and recognizes the acceptability of the site for future designs not yet known.

A draft list of the parameters (not values) included in the PPE is attached for illustration and discussion purposes. Early NRC feedback is requested concerning potential NRC review difficulties so that we can address completeness with respect to performing safety and environmental reviews.

Discussion of the PPE scope should also aid the NRC in revising its review guidance. In particular, the published and 1996 draft SRPs do not yet support the existing Part 52 and 100 processes and requirements: e.g., (a) the SRPs do not include the Dec, 1996 changes to Part 100, and (b) some of the SRPs assume that site characteristics and specific SSC design information will be reviewed concurrently (this will not occur until the combined license application). The ESP application and NRC review should draw conclusions about site acceptability, not SSC design acceptability; the ESP review should conclude which site characteristics must be considered in the design of SSCs.

The PPE approach is consistent with the consensus expectation that, given the range of promising designs that may become commercially available during the life of an ESP, it is not practical or realistic for ESP applicants to specify the type of plant to be built. There is no need to specify plans to build a particular technology (e.g. BWR, PWR, gas, etc.); the bounding PPE will envelop various technologies to the extent we know the potential important parameters. If future technologies have fundamentally different critical parameters than those encompassed by the PPE, or unbounded parameters, those safety and/or environmental issues would potentially require NRC review during the Combined License application.

The bounding PPE allows applicants and the NRC to move forward with ESPs without a reactor type being specified. While the industry believes the bounding PPE approach to be consistent with 52.17(a)(1), we plan to recommend a clarification of 52.17(a)(1) as part of the forthcoming Part 52 NOPR to emphasize the acceptability of using bounding parameters in an ESP application in lieu of physical descriptions of the major SSCs of the facility.

NRC POSITION:

(4/24/02) Applicants may submit bounding plant parameters. The applicants determine those bounding values. Additional reasonable conservatisms may be included in the proposed bounding values. The applicant need not justify or submit the basis for each bounding value and accepts the risk that a specific technology parameter later addressed as part of a COL application may exceed the bounding value accepted at the ESP stage. Any such variances would be addressed at the COL stage on a case basis.

In certain instances, a bounding parameter approach appears impractical. For example, some icing effects can only be considered in the context of specific designs. In such instances, applicants are expected to provide sufficient detailed design information for specific reactor types that could reasonably be expected to be built on the proposed site.

Table 1. Parameters Organized By Sections

PPE Section[1]			Value[2]
1.	Structures		
	1.1	Foundation Embedment	
	1.2	Height	
	1.4	Precipitation (for Roof Design)	
		1.4.1 Maximum Rainfall Rate	
		1.4.2 Snow Load	
	1.5	Safe Shutdown Earthquake (SSE)	
		1.5.1 Design Response Spectra	
		1.5.2 Peak Ground Acceleration	
		1.5.3 Time History	
	1.8	Site Water Level (Allowable)	
		1.8.1 Maximum Flood (or Tsunami)	
		1.8.2 Maximum Ground Water	
	1.9	Soil Properties Design Bases	
		1.9.1 Liquefaction	
		1.9.2 Minimum Bearing Capacity (Static)	
		1.9.3 Minimum Shear Wave Velocity	
	1.11	Tornado (Design Bases)	
		1.11.1 Maximum Pressure Drop	
		1.11.2 Maximum Rotational Speed	
		1.11.3 Maximum Translational Speed	
		1.11.4 Maximum Wind Speed	
		1.11.5 Missile Spectra	
		1.11.6 Radius of Maximum Rotational Speed	
		1.11.7 Rate of Pressure Drop	
	1.12	Wind	
		1.12.1 Basic Wind Speed	
		1.12.2 Importance Factors	
2.	Normal Plant Heat Sink		
	2.1	Ambient Air Requirements	See Note 3
	2.1.1	Normal Shutdown Max Ambient Temp (1% Exceed)	
	2.1.2	Normal Shutdown Max Wet Bulb Temp (1% Exceed)	
	2.1.3	Normal Shutdown Min Ambient Temp (1% Exceed)	
	2.1.5	Rx Thermal Power Max Ambient Temp (0% Exceed)	

PPE Section[1]			Value[2]
2.1.6	Rx Thermal Power Max Wet Bulb Temp (0% Exceed)		
2.1.7	Rx Thermal Power Min Ambient Temp (0% Exceed)		
2.2	Blowdown Pond Acreage (24 hr blowdown)		
2.3	Condenser/Heat Exchanger Duty		
2.6	Maximum Inlet Temp Condenser/Heat Exchanger		
2.7	Mechanical Draft Cooling Towers		
	2.7.1	Acreage	
	2.7.3	Approach Temperature	
	2.7.4	Blowdown Constituents and Concentrations	See Table 2
	2.7.5	Blowdown Flow Rate	
	2.7.6	Blowdown Temperature	
	2.7.7	Cooling Tower Temperature Range	
	2.7.8	Cooling Water Flow Rate	
	2.7.9	Cycles of Concentration	
	2.7.10	Evaporation Rate	
	2.7.12	Heat Rejection Rate	
	2.7.13	Height	
	2.7.15	Makeup Flow Rate	
	2.7.16	Maximum Consumption of Raw Water	
	2.7.17	Monthly Average Consumption of Raw Water	
	2.7.18	Noise	
	2.7.22	Stored Water Volume	
2.8	Natural Draft Cooling Towers		
	2.8.1	Acreage	
	2.8.2	Approach Temperature	
	2.8.3	Blowdown Constituents and Concentrations	See Table 2
	2.8.4	Blowdown Flow Rate	
	2.8.5	Blowdown Temperature	
	2.8.6	Cooling Tower Temperature Range	
	2.8.7	Cooling Water Flow Rate	
	2.8.8	Cycles of Concentration	
	2.8.9	Evaporation Rate	

PPE Section[1]			Value[2]
	2.8.11	Heat Rejection Rate	
	2.8.12	Height	
	2.8.14	Makeup Flow Rate	
	2.8.15	Maximum Consumption of Raw Water	
	2.8.16	Monthly Average Consumption of Raw Water	
	2.8.17	Noise	
	2.8.20	Stored Water Volume	
2.9	Once-Through Cooling		
	2.9.1	Cooling Water Discharge Temperature	
	2.9.2	Cooling Water Flow Rate	
	2.9.3	Cooling Water Temperature Rise	
	2.9.4	Evaporation Rate	
	2.9.5	Heat Rejection Rate	
2.10	Ponds		
	2.10.1	Acreage	
	2.10.2	Blowdown Constituents and Concentrations	See Table 2
	2.10.3	Blowdown Flow Rate	
	2.10.4	Blowdown Temperature	
	2.10.5	Cooling Pond Temperature Range	
	2.10.6	Cooling Water Flow Rate	
	2.10.7	Cycles of Concentration	
	2.10.8	Evaporation Rate	
	2.10.9	Heat Rejection Rate	
	2.10.10	Makeup Flow Rate	
2.10.11	Maximum Consumption of Raw Water		
2.10.12	Monthly Average Consumption of Raw Water		
	2.10.13	Stored Water Volume	
Ultimate Heat Sink			
3.1	Ambient Air Requirements		
	3.1.1	Maximum Ambient Temperature (0% Exceedance)	
	3.1.2	Maximum Wet Bulb Temperature (0% Exceedance)	
	3.1.3	Minimum Ambient Temperature (0% Exceedance)	
3.2	CCW Heat Exchanger Duty		

PPE Section[1]			Value[2]
3.5	Maximum Inlet Temp to CCW Heat Exchanger		
3.6	Mech Draft Cooling Towers		
	3.6.1	Acreage	
	3.6.3	Approach Temperature	
	3.6.4	Blowdown Constituents and Concentrations	See Table 2
	3.6.5	Blowdown Flow Rate	
	3.6.6	Blowdown Temperature	
	3.6.7	Cooling Tower Temperature Range	
	3.6.8	Cooling Water Flow Rate	
	3.6.9	Cycles of Concentration	
	3.6.10	Evaporation Rate	
	3.6.12	Heat Rejection Rate	
	3.6.13	Height	
	3.6.15	Makeup Flow Rate	
3.6.16	Maximum Consumption of Raw Water		
3.6.17	Monthly Average Consumption of Raw Water		
	3.6.18	Noise	
	3.6.22	Stored Water Volume	
3.7	Once-Through Cooling 3.7.1	Cooling Water Discharge Temperature	
	3.7.2	Cooling Water Flow Rate	
	3.7.3	Cooling Water Temperature Rise	
	3.7.4	Evaporation Rate	
	3.7.5	Heat Rejection Rate	
	3.7.6	Minimum Essential Flow Rate	
3.8	Ponds		
	3.8.1	Acreage	
	3.8.2	Blowdown Constituents and Concentrations	See Table 2
	3.8.3	Blowdown Flow Rate	
	3.8.4	Blowdown Temperature	
	3.8.5	Cooling Pond Temperature Range	
	3.8.6	Cooling Water Flow Rate	
	3.8.7	Cycles of Concentration	

PPE Section[1]				Value[2]
		3.8.8	Evaporation Rate	
		3.8.9	Heat Rejection Rate	
		3.8.10	Makeup Flow Rate	
		3.8.11	Maximum Consumption of Raw Water	
		3.8.12	Monthly Average Consumption of Raw Water	
		3.8.13	Stored Water Volume	
4.	Containment Heat Removal System (Post-Accident) 4.1 Ambient Air Requirements 4.1.1 Maximum Ambient Air Temperature (0% Exceedance)			
	4.1.2		Minimum Ambient Temperature (0% Exceedance)	
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Notes:

1. PPE includes all parameters in Tables 1-6 and is defined by the Early Site Permit Demonstration Program Plant Parameters Envelope Report, Rev. 2, Joint Contractors, March 1993. Section numbering used in 1993 (where various subsections were removed or not used to report values during development in 1992 and 1993) is maintained.

2. PPE values used in an ESP application should be based on plant designs being considered.

3. Applicants must identify main condenser cooling system alternatives (e.g., mechanical or natural draft cooling towers, cooling ponds, once-through cooling) to be deployed. To maintain multiple options, the most restrictive value for each cooling system PPE section should be used in the ESP application (e.g., 550 feet cooling tower height selected if both mechanical and natural draft towers are being considered).

Table 2. Blowdown Constituents and Concentrations[1]

Constituent	Concentration (ppm)[2]		
	River Source	Well/Treated Water	Envelope
Chlorine demand			
Free available chlorine			
Chromium			
Copper			
Iron			
Zinc			
Phosphate			
Sulfate			
Oil and grease			
Total dissolved solids			
Total suspended solids			
BOD, 5-day			

Notes:
(1) See PPE Sections 2.7.4, 2.8.3, 2.10.2, 3.6.4, and 3.8.2.
(2) Assumed cycles of concentration equals 4.

Table 3. Principal Radionuclides in Solid Radwaste[1]

Radionuclide	(Ci/yr)
Fe-55	
Fe-59	
Co-60	
Mn-54	
Cr-51	
C0-58	
Nl-63	
H-3	
C-14	
Nb-95	
Ag-110m	
Zr-95	
Ba-140	
Pu-241	
La-140	
Other	
Total (rounded to nearest hundred)	

Notes:
(1) See PPE Section 12.2.2

Table 4. Yearly Emissions From Auxiliary Boilers[1]

Pollutant Discharged	Quantity[2] (lbs)
Particulates	
Sulfur oxides	
Carbon monoxide	
Hydrocarbons	
Nitrogen oxides	

Notes:
(1) See PPE Section 21.2.
(2) Emissions are based on 4 hrs/month operation for each of the generators.

Table 5. Yearly Emissions From Standby Diesel Generators[1]

Pollutant Discharged	Quantity[2] (lbs)
Particulates	
Sulfur Oxides	
Carbon Monoxide	
Hydrocarbons	
Nitrogen oxides	

Notes:
(1) See PPE Section 26.3.
(2) Emissions are based on 4 hrs/month operation for each of the generators.

Table 6. Standby Power System Gas Turbine Flue Gas Effluents[1]

FUEL:	
Effluent	**Quantity[2] (lbs)**
NO_x (PPMVD @ 15% o_2	
NO_x as NO_2 (LB/HR)	
CO (PPMVD)	
CO (LB/HR)	
UHC (PPMVD)	
UHC (LB/HR)	
VOC (PPMVD)	
VOC (LB/HR)	
SO_2 (PPMVD)	
SO_2 (LB/HR)	
SO_3 (PPMVD)	
$S0_3$ (LB/HR)	
SULFUR MIST (LB/HR)	
PARTICULATES (LB/HR)	
Exhaust Analysis %	
ARGON	
NITROGEN	
OXYGEN	
CARBON DIOXIDE	
WATER	

Notes:
(1) See PPE Section 26.8.
(2) Emissions are based on 4 hrs/month operation for each of the generators.

ESP-7

TOPIC: Guidance for satisfying 52.17(a)(1) requirement for description and safety assessment of the facility.

DESCRIPTION:

10 CFR 52.17(a)(1) requires, in part, that an early site permit (ESP) application contain an analysis and evaluation of the major structures, systems, and components of the facility that bear significantly on the acceptability of the site under the radiological consequence evaluation factors identified in § 50.34(a)(1).

This language becomes problematic when the applicant has not decided on the type of reactor to be located at the site. How does the applicant analyze and evaluate when the facility and SSCs are not known?

QUESTIONS FOR DISCUSSION:

1. NRC: How do the applicants plan to satisfy these requirements in your forthcoming ESP applications for other than the light-water reactor designs?
2. NRC: How do the applicants plan to establish/characterize radiological release categories and their respective frequencies for use in the environmental assessment of Class 1 through 9 accidents?

INDUSTRY APPROACH (PRELIMINARY):

The applicants intend to accomplish the required analysis and evaluation by means of a bounding approach, using several of the parameters specified in the plant parameters envelope. A PPE approach is consistent with the expectation that applicants need not know the type of reactor to be constructed at the time of an ESP application.

Each applicant would provide a bounding analysis intended to envelope potential reactor types of interest. The analysis would consist of site-specific information, the bounding PPE values, and an evaluation of the site-specific information to demonstrate that it is bounded by the PPEs. As discussed in ESP-6, the various PPE parameters are effectively considered to be equivalent to the facility description and are representative of the structures, systems, and components that would bear significantly on the acceptability of the site.

It's important to note that 10 CFR 52.17(a)(1) requires a safety assessment of the acceptability of the site under the radiological consequence evaluation factors[1] identified

[1] The "radiological consequence evaluation factors" identified in 10 CFR 50.34(a)(1) are those contained in 10 CFR 50.34(a)(1)(ii)(D)(1)&(2), which specifies a 25 rem TEDE individual dose limit at the exclusion area boundary for any 2 hour period following the postulated fission product release, and 25 rem TEDE individual dose limit at the outer boundary of the LPZ during the entire period of radioactive cloud passage, respectively.

in 10CFR50.34(a)(1) to demonstrate site suitability. It does not require an evaluation of radiological accidents. Thus, characterization of specific radiological consequences for Class 1-9 accidents would not be addressed in the ESP application because no reactor type has been chosen and no specific accidents have yet be defined that would lend themselves to classification. Once a technology has been selected, (e.g., at the COL stage), the applicant would be expected to demonstrate that the various classes of accidents for the selected technology are bounded by the relevant PPEs specified in the Early Site Permit.

The key steps in meeting the requirements of 10 CFR 52.17(a)(1) are as follows:

- **A set of bounding PPEs would be established and site-specific information obtained**. The bounding PPEs include atmospheric dispersion (x/Q) factors, release points, and a postulated source term. Site-specific information would consist of measured or calculated atmospheric dispersion characteristics for the selected site.

- **Compliance with the radiological criteria in 10 CFR 50.34 would be analyzed and evaluated**. The analysis and evaluation would consist of a comparison of the site-specific atmospheric dispersion characteristics against those specified in the bounding PPE. The bounding values would be selected with knowledge that, under appropriate conditions, those values would yield acceptable radiological dose consequences that meet the 10 CFR 50.34(a)(1) requirements.

- **Site suitability is demonstrated**. A demonstration that the site-specific atmospheric dispersion characteristics are bounded by the selected PPEs provides reasonable assurance of the site's suitability with respect to the radiological consequence evaluation factors and is sufficient to meet the requirements of 10 CFR 52.17(a)(1). At the COL stage, the specific plant design and accident analyses would be compared to those specified in the ESP to ensure they remain within the bounding parameters. Applicants accept the business risk associated with such an approach and acknowledge that if a selected technology resulted in impacts that were not bounded, further evaluation and analysis would be required at the COL stage to demonstrate the acceptability of selected design on the site.

ESP-12

TOPIC: NEPA consideration of Severe Accident Mitigation Alternatives (SAMAs) for purposes of Part 52 ESPs.

DESCRIPTION:

Consideration of design and process alternatives for mitigation of severe accidents is problematic in the ESP context when the applicant has not decided on the reactor type.

QUESTIONS FOR DISCUSSION:

1. NRC: How do the applicants plan to satisfy the NEPA requirement in your forthcoming ESP applications for other than the light-water reactor designs?

INDUSTRY APPROACH:

SAMA considerations cannot be addressed at Early Site Permit (ESP) stage since design and processes are not yet identified. SAMA considerations are only practicable for design evaluations such as in standard design certification or combined operation license applications. Therefore, as discussed below, SAMA consideration will be accomplished as part of the COL application and review.

Pertinent NEPA and NRC requirements:

- The National Environmental Policy Act (NEPA) requires:

  Sec. 102 [42 USC § 4332]. The Congress authorizes and directs that, to the fullest extent possible: (1) ... and (2) all agencies of the Federal Government shall – (C) include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on -- (iii) alternatives to the proposed action....

- NRC regulations in 10CFR Part 51 implement Section 102(2) of NEPA. In addition for an Early Site Permit (ESP), §52.17(a)(2) requires:

  A complete environmental report as required by 10 CFR 51.45 and 51.50 must be included in the application, provided, however, that such environmental report must focus on the environmental effects of construction and operation of a reactor, or reactors, which have characteristics that fall within the postulated site parameters, and provided further that the report need not include an assessment of the benefits (for example, need for power) of the proposed action, but must include an evaluation of alternative sites to determine whether there is any obviously superior alternative to the site proposed.

- §51.50 is entitled, "Environmental report – construction permit stage," and requires:

  Each applicant for a permit to construct a production or utilization facility covered by §51.20 shall submit with its application the number of copies, as specified in §51.55, of a separate

document, entitled "Applicant's Environmental Report -- Construction Permit Stage," which shall contain the information specified in §§51.45, 51.51 and 51.52. Each environmental report shall identify procedures for reporting and keeping records of environmental data, and any conditions and monitoring requirements for protecting the non-aquatic environment, proposed for possible inclusion in the license as environmental conditions in accordance with §50.36b of this chapter.

Sections 51.45, 51.51 and 51.52 do not specifically identify SAMA consideration as a requirement. §51.45(b)(3) does require consideration of "alternatives to the proposed action," but §51.45(c) also indicates that "the analyses for environmental reports shall, **to the fullest extent practicable,** quantify the various factors considered. To the extent that there are important qualitative considerations or factors that cannot be quantified, those considerations or factors shall be discussed in qualitative terms. The environmental report should contain sufficient data to aid the Commission in its development of an independent analysis." §§51.51 and 51.52 discuss fuel cycle and transportation effects (i.e., Tables S-3 and S-4) and do not discuss SAMAs.

As indicated in SECY-02-0077, the type of facility may not be known at the ESP stage, and therefore, the structures, systems, and components (SSCs) of the particular facility design are not known. Thus, certain bounding assumptions must be made regarding the facility, and its supporting SSCs. However, the purpose of these bounding assumptions is only to show site suitability, not to address any specific reactor design. It is not practicable to quantify, at the ESP stage, or discuss in any manner, design or process alternatives when neither specific design nor specific processes are proposed for construction. Thus, "no discussion" of SAMA meets the §§51.45 and 51.50 requirements, and therefore §52.17(a)(2).

This same logic is appropriate for complying with the guidance provided to the NRC within NUREG-1555, Environmental Report Standard Review Plan, Section 7.3 entitled "Severe Accident Mitigation Alternatives," which specifically identifies the review plan section as applicable to ESP application reviews. The review procedures within this SRP specifically identify the review of the applicants "design alternatives and procedural modifications" which may not be known at the ESP stage. Additionally, the SRP acceptance criteria are based on...

- U.S. Court of Appeals decision in Limerick Ecology Action v. NRC 869 F.2d 719 (3rd Cir. 1989) with respect to the requirement that the NRC include consideration of certain SAMAs in environmental impact reviews performed under Section 102(2)(c) of NEPA ***as part of operating license applications***, and

- 50.34(f)(1)(i) required (construction permit) probabilistic risk assessment with aim to improve reliability of core and containment heat removal **systems**.

Again, there is a presumption that the systems are identified. But as indicated above, such discussion is not practicable at the ESP stage.

This inability to address design issues was recognized as early as SECY-91-0041 which indicated that the environmental report for an ESP need not include full analysis of environmental impacts of severe accidents.

Sections 52.17 and 52.18 also recognize that environmental review will not cover all issues that will be required for a combined operating license (COL). One example called out in the regulations is the "need for power" under the benefits section of the proposed action. Additionally, 52.79(a)(1) for a COL recognizes previous reviews may not have covered all environmental issues. Thus sufficient regulation exists to assure SAMAs will be addressed at the design and process review stage.

NRC STAFF POSITION:

(later)

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Reference:

1. March 5, 1984 letter from Francis X. Gavigan, Director, Office of Breeder Demonstration Projects, Office of Nuclear Energy, U. S. Department of Energy, to Mr. Thomas King, Acting Director, CRBR Program Office, U. S. Nuclear Reg. Commission, Subject: Clinch River Breeder Reactor Plant (CRBRP) Site Redress Plan.